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LETTER TO THE EDITOR

Response to Bousfield and LeBlond Shooting Pipefish in a Barrel; or, Sauropterygian "Mega-Serpents" and Occam's Razor

In their response to our recent article (Woodley, Naish, & McCormick 2011), Bousfield and LeBlond (2011) argue on the basis of purported morphological and behavioral differences that the case for Hagelund's juvenile "Cadborosaurus" being a pipefish is weakened into triviality. We note several major problems with their response and feel that their dismissive tone indicates a biased and unscientific approach to the investigation of this subject. First, note that Bousfield and LeBlond (2011) thought that, by attempting to dismiss our pipefish identification, they had completed their task of critiquing our paper. While their "critique" is grossly inadequate in any case, note that they made no mention of the assorted additional fish taxa also found by us (Woodley, Naish, & McCormick 2011) to be more similar to the Hagelund specimen than the specimen was to their "Cadborosaurus" construct.

Second, Bousfield and LeBlond's (2011) arguments involve gross misrepresentation of Hagelund's account, demonstrating unyielding bias toward their pet "mega-serpent" hypothesis and a total unwillingness to explore alternate interpretations. Their most alarming claim is that Hagelund's specimen held its head out of water for 5–10 minutes, ruling out pipefishes, which only engage in this behavior briefly. However, Hagelund never gave an estimated duration for his encounter, let alone this particular behavior; prior to the specimen's capture it was only visible due to a "small vee of wavelets" at the water's surface, meaning that it did not hold its head out of water for the entire encounter. While there is an ambiguous area behind the eyes and in front of the "flipper-like feet" in Hagelund's drawing, nowhere did Hagelund claim that a "neck" was present (contra Bousfield & LeBlond 2011)—in fact the spacing there is consistent with Bay Pipefish morphology. Furthermore, Hagelund never used the description "large jaws" (contra Bousfield & LeBlond 2011), only describing the mouth as "open[ing] slightly" and illustrating the mouth-line terminating well anterior to the eyes, both of which are again compatible with a pipefish. Bizarrely, Bousfield and LeBlond (2011) regard the dorsal fin of pipefishes as "pronounced" when it is actually a transparent, often hard-to-spot structure which takes up a small portion of total length. Bousfield

and LeBlond (2011) pointlessly cite a "very elongate post-vent tail region" as a detail of dissimilarity between Hagelund's specimen and a pipefish despite the fact that Hagelund never described or illustrated a vent!

Hagelund clearly conflated the "spade-shaped tail" with the "tiny flipper-like fins" in his description and illustration of the caudal region. Contra Bousfield and LeBlond (2011), there is no indication from Hagelund's text or illustration of a tail separate from the fins nor is the orientation of the fins (horizontal or vertical) directly mentioned. Hagelund initially confused the specimen for a sea snake and referred to it as "eel-like," which implies lateral undulation and a vertical (fish-like) tail, contra the claim of our critics. Our analysis (Woodley, Naish, & McCormick 2011) specifically noted that the description of teeth is problematic, but we again note the 18-year gap between Hagelund making his observations and recounting them in his book. Recollection of any memory after such a long interval will surely be prone to distortion.

Third, the crux of Bousfield and LeBlond's (2011) argument appears to rest on an interpretative mangling of Occam's razor, which they take to imply that explanatory preference should be given to their singleton identity theory of Caddy (i.e. that most encounters can be interpreted as evidence for the existence of a single entity, specifically an extant sauropterygian of some kind [e.g. Bousfield & LeBlond 1995]) over the hypothesis that encounters with creatures of highly variable morphology and behavior (see Figure 1) should be interpreted first and foremost as encounters with a diversity of known animals.

Figure 1. A comparison of all known drawings of caddy indicates a diversity of morphologies with few consistencies across encounters (by Cameron A. McCormick).

Sober (2000:32) in his *Philosophy of Biology* would appear to disagree with this interpretation of Occam's razor, stating instead that "The overall plausibility of a hypothesis is a function both of its likelihood relative to *present* observations and its *antecedent* plausibility [italics in original]." What this means in practice is that if a drunk man reports having seen a pink elephant, it is true that we can account for his observation by positing the existence of a pink elephant. However, refusal to posit such an entity does not violate Occam's razor, *because pink elephants are not antecedently plausible*. Like the pink elephant, the idea that there exist extant sauropterygians corresponding to the descriptions of Caddy is not even remotely antecedently plausible, as has been repeatedly argued elsewhere (Bauer & Russell 1996, Naish 2001, Staude & Lambert 1995, Woodley, Naish, & Shanahan 2008). Extant sauropterygians aside, the idea that one type of animal is being reported across Caddy encounters also does not appear to be antecedently plausible (we refer again to Figure 1). We (and the reader) are therefore under no obligation to give explanatory preference to Bousfield and LeBlond's preferred explanation for Hagelund's baby "sea serpent": In point of fact, Occam's razor obliges us to give preference not just to our proposed explanation, but to *any* explanation with similar antecedent plausibility (i.e. the idea that it may have been a poacher or sturgeon or some such other) over that preferred by our critics.

On these grounds the entire substance of the Bousfield and LeBlond (2011) objection is negated. To work within the framework of science, Bousfield and LeBlond must operate in line with another well-known principle, i.e. the idea that extraordinary claims require extraordinary evidence, and thus must present evidence of a sort that reduces the antecedent implausibility of their preferred singleton hypothesis. Subjective and erroneous interpretations of drawings and eyewitness testimony made almost two decades after an alleged encounter do not advance their cause.

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